**Before the**
**Federal Communications Commission**
**Washington, D.C. 20554**

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| In the Matter of | ) | |
| | ) | |
| Revision of Part 15 of the Commission's Rules to | ) | |
| Permit Unlicensed National Information | ) | ET Docket No. 13-49 |
| Infrastructure (U-NII) Devices in the 5 GHz Band | ) | |

To: The Commission

# REPLY COMMENTS OF

## Open Technology Institute at the New America Foundation
## Public Knowledge

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The Open Technology Institute at the New America Foundatio and Public Knowledge (hereinafter "Public Interest Organizations") are pleased to submit these Reply Comments in response to the Commission's Notice of Proposed Rulemaking ("*NPRM*") adopted in the above-captioned proceeding.[1]

## I. INTRODUCTION AND SUMMARY

The undersigned Public Interest Organizations strongly support the Commission's proposal to expand and enhance unlicensed access in the 5 GHz band by designating the U-NII-2A band and U-NII-4 band for unlicensed use while also generally harmonizing the technical rules to permit more contiguous and wide-channel use of the band in a manner that takes advantage of the emerging high-capacity 802.11ac Wi-Fi standard and encourages future innovations. The beneficial and mushrooming impact of unlicensed spectrum on the telecom sector and the broader U.S. economy is well documented. Expanding unlicensed access across a variety of frequencies with different propagation characteristics will spur innovation and is the most promising strategy for satisfying exploding consumer demand for wireless broadband applications and services and increasing the ability of wireless Internet service providers to serve rural and remote communities. Expanding unlicensed access to both the low-frequency TV bands below 1 GHz and the higher, mostly line-of-sight frequencies above 5 GHz can each complement the use of licensed spectrum and facilitate new market entrants, services and applications that rely solely on unlicensed.

[1] *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, Notice of Proposed Rulemaking, ET Docket No. 13-49 (rel. Feb. 20, 2013) ("*NPRM*"). Commission staff extended the Reply Comment deadline to July 24, 2013. *See Order*, DA 13-1388 (rel. June 17, 2013).

Accordingly, the Public Interest Organizations concur with the many commenters that have recommended the Commission use this proceeding to enhance the economic and social value of unlicensed access to the 5 GHz band in the following specific ways:

First, we strongly support opening the 5.35-5.47 GHz (U-NII-2B) and 5.85-5.925 (U-NII-4) bands for unlicensed use, subject to necessary interference protections for federal and non-federal band incumbents. Opening this 195 megahertz of additional unlicensed capacity will have a multiplier effect on the value of the band for unlicensed use, since it creates the potential for a contiguous band of 775 megahertz of unlicensed spectrum in the 5 GHz band.

Second, we generally support the Commission's proposals to harmonize the currently divergent operating rules across the band to create the potential for a contiguous 775 megahertz of unlicensed capacity that is all available for both outdoor and indoor Wi-Fi networking, and at power levels as robust as those that apply currently to the U-NII-3 band. Contiguous unlicensed access and harmonized rules that enable access to 80 and 160 megahertz channels would greatly amplify the potential increases in capacity for Wi-Fi operations. Harmonizing the operating rules across the 200 megahertz of a combined U-NII-3 and U-NII-4 band is particularly important to facilitate the wide and contiguous channels needed to capitalize fully on the emerging 802.11ac Wi-Fi standard.

Third, although the Public Interest Organizations generally support harmonizing the operating rules for unlicensed access to the U-NII-1, U-NII-3 and U-NII-4 bands – and adopting the current U-NII-3 rules that promote metropolitan Wi-Fi networking as a baseline – we question whether it is necessary to restrict the flexibility permitted under Section 15.247 ISM rules that have proven so useful in facilitating the use of high-gain antennas for backhaul and connectivity to rural broadband deployments. On this point we agree with the Wireless Internet

Service Providers Association (WISPA) that harmonized "baseline" rules can provide a very robust "worst case" for unlicensed operators, while continuing to allow for greater flexibility and more permissive spectrum sharing techniques when feasible in a particular U-NII sub-band where interference protection to band incumbents can be accomplished through stricter device certification rules and recommended improvements to Dynamic Frequency Selection (DFS).

Fourth, we strongly support the Commission's proposal to modify the U-NII-1 rules to permit higher-power outdoor operations. We agree with the many commenters that support both removing the restrictions on outdoor use and harmonizing the U-NII-1 rules with the increased power and other operating restrictions that apply under the current U-NII-3 rules – and, further, applying those more robust operating rules as well to the new U-NII-4 band at 5.85-5.925 MHz.

Finally, we ask the Commission to consider that as geolocation database management becomes more firmly established as a secure means to govern shared access to TV band White Space and the 3550-3700 MHz band, it could be both feasible and more efficient for certain devices and services to obtain permission to transmit on 5 GHz spectrum in particular geographies based on frequent communication with either an established or newly-designated geolocation database manager. We agree with the proposal by Google and Microsoft that the Commission should consider authorizing this alternative approach to unlicensed operators as an alternative to DFS on an optional and voluntary basis in at least particular sub-bands where it would be equally or even more effective as a means of avoiding harmful interference to federal and non-federal incumbents.

## II. THE COMMISSION SHOULD ALLOCATE AN ADDITIONAL 195 MHZ OF CONTIGUOUS UNLICENSED SPECTRUM FOR OUTDOOR AND INDOOR USE IN THE 5 GHZ BAND

The Public Interest Organizations strongly support the Commission's proposal to open the 5.35-5.47 GHz (U-NII-2B) and 5.85-5.925 (U-NII-4) bands for shared and unlicensed use, subject to interference protection for federal and non-federal band incumbents.[2] Although parties differ concerning whether and to what extent these two bands can be opened for unlicensed sharing, the strong and diverse support in the record for the additional capacity and contiguous, wide channels made possible by adding these segments suggests the need for further study and consideration of how best to accommodate the needs of both incumbents and unlicensed uses. For example, Qualcomm's proposal to segment the U-NII-4 band to provide exclusive use by Dedicated Short Range Communications (DCRS) licensees on the upper 20-to-30 megahertz of the band for safety of life applications (which are predominantly narrowband), while opening the lower 45-to-55 megahertz for shared access by non-safety DCRS and unlicensed users strikes us as the sort of constructive potential solution that deserves further study.[3]

The Public Interest Organizations also support the Commission's proposal to add the 25 megahertz at 5825-5850 MHz to the U-NII-3 band. There appears to be little if any opposition in the record to this expansion, which would permit contiguous unlicensed access across the U-NII-3 and at least the lower portion of the U-NII-4 bands. This is important not only because it adds another 25 megahertz of capacity, but also because it connects the U-NII-3 and U-NII-4 bands to create the potential for an additional 160 MHz high-capacity channel, assuming that the

[2] *NPRM* at ¶¶ 96, 97.
[3] Comments of Qualcomm Incorporated, ET Docket No. 13-49 (May 28, 2013).

operating rules are sufficiently harmonized.[4] As the Wi-Fi Alliance observed, "the addition of the 25 MHz to the U-NII-3 band will help promote use of devices using the 802.11ac standard under a clear and consistent set of equipment authorization rules."[5]

Opening an additional 195 megahertz of unlicensed capacity, together with adding 5825-5850 MHz to the U-NII-3 sub-band, would have a multiplier effect on the value of the entire 5 GHz band for unlicensed use, since it creates the potential for a contiguous band of 775 megahertz of unlicensed spectrum. The combination of this added capacity, higher data rates from wide contiguous channels, and more harmonized operating rules across the 5 GHz band will amplify the utility of the band for a wide variety of unlicensed applications and services. By employing the emerging 802.11ac standard, a Wi-Fi device or network could achieve gigabit capacity with as many as nine 80-megahertz channels, or four 160-megahertz channels, across the 5 GHz band.[6] The cable industry association (NCTA) observed in its comments, "because much of the 555 MHz of [5 GHz band] spectrum currently labeled as available for unlicensed use is, in fact, not suitable for most Wi-Fi deployments, NCTA estimates that favorable changes to the U-NII-1 rules and the addition of U-NII-4 could triple the amount of usable unlicensed spectrum currently available to [metropolitan] Wi-Fi network providers" at U-NII-3.[7]

Expanding unlicensed access across a variety of frequencies with different propagation characteristics and channel capacities will spur innovation and the overall value of unlicensed spectrum to the broader economy. Both the low-frequency bands below 1 GHz – and the higher, mostly line-of-sight frequencies above 5 GHz – complement the use of licensed spectrum and

[4] *See, e.g.,* Comments of the National Cable & Telecommunications Association, ET Docket No. 13-49 (May 28, 2013) ("NCTA Comments"), at 17-18.
[5] Comments of Wi-Fi Alliance, LLC, ET Docket No. 13-49 (May 28, 2013), at 11; *see NPRM* at ¶ 29.
[6] *See* Comments of Motorola Mobility LLC, ET Docket No. 13-49 (May 28, 2013) ("Motorola Mobility Comments"), at 3.
[7] NCTA Comments at 12, n. 36.

facilitate new market entrants, services and applications that rely solely on unlicensed. We concur with the observation of Google and Microsoft that "[C]onsumers need unlicensed access to both high-frequency and lower-frequency spectrum to address their growing demand for diverse wireless devices and applications with different ranges and capabilities."[8]

Expanding unlicensed capacity and enabling wide channels for Wi-Fi offload and other applications in the 5 GHz band will help to meet the exploding consumer demand for high-capacity mobile data applications and services, and do so at a low marginal cost compared to auctioning exclusively-licensed spectrum. Allocating additional unlicensed spectrum also spurs innovation and promotes intensive and efficient spectrum re-use. "While licensed access provides operators the certainty they may need to invest, unlicensed access allows a larger number of participants individually to make smaller investments, and to introduce new products and services quickly and affordably."[9]

The beneficial and mushrooming impact of unlicensed spectrum on the telecom sector and on the broader U.S. economy is well documented. In comments and reply comments filed in response to the Commission's incentive auction and 3.5 GHz band NPRM's earlier this year,[10] our Public Interest Spectrum Coalition (PISC) cited extensive evidence of the positive economic and social impacts of expanding public access to unlicensed and shared spectrum, as did the Consumer Federation of America and other parties.[11] We will not rehash those filings here

[8] Comments of Google and Microsoft, ET Docket No. 13-49 (May 28, 2013) ("Google/Microsoft Comments"), at 3.
[9] *Id.* at 2.
[10] Comments of the Public Interest Spectrum Coalition, *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Notice of Proposed Rulemaking and Order, GN Docket No. 12-354 (Feb. 20, 2013); Comments of the Public Interest Spectrum Coalition, *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Notice of Proposed Rulemaking, Docket No. 12-268 (Jan. 25, 2013), at 8-20.
[11] *See, e.g.*, Comments of Consumer Federation of America, *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Notice of Proposed Rulemaking, Docket No. 12-268 (Jan. 25, 2013), at 2, updating key findings from its previously published study on the economics of Wi-Fi offloading. *See* Mark Cooper, *Efficiency Gains and Consumer Benefits of Unlicensed Access to the Public Airwaves: The Dramatic Success of*

except to note that despite auctions anticipated to occur over the next several years, there is simply not enough exclusively-licensed spectrum to meet the rising demand for wireless data, to sustain a competitive market for mobile broadband, and to keep prices at an affordable level.

One of the many proven benefits of unlicensed spectrum is that it facilitates spectrum frequency re-use over very small areas (a home, business, or school). Because of its efficiency and low cost, Cisco's *Virtual Networking Index* projects that unlicensed spectrum will carry as much IP traffic to and from consumer devices as wired lines by 2016 – and 5 to 10 times as much data as mobile carrier networks.[12] As Sprint explained in an FCC filing last year, Wi-Fi "gains its efficiency and speeds in part because it only needs to use radio transmission for a very small portion of the end-to-end route taken by data traffic. The vast majority of the route is along the less traffic-sensitive wired network."[13]

Since most video and other high-bandwidth applications on mobile devices are used either indoors or outdoors within range of a wired local area network, the increasingly widespread availability of Wi-Fi operating on *unlicensed* spectrum is the single most important factor in mitigating the "spectrum crunch." It is critical in this regard to distinguish between truly *mobile* data demand (on the go) and *nomadic* data demand (indoors or outdoors near a wired connection). Cisco's Internet Business Solutions Group (IBSG) conducted a survey last year of more than 1,540 U.S. individual and business users of mobile data devices. The Cisco survey

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*Combining Market Principles and Shared Access*, Consumer Federation of America (Jan. 2012), available at http://www.markcooperresearch.com/SharedSpectrumAnalysis.pdf. *See also* Comments of Google Inc. and Microsoft Corporation, *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Notice of Proposed Rulemaking, Docket No. 12-268 (Jan. 25, 2013), at 2-21; Comments of the National Cable & Telecommunications Association, *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Notice of Proposed Rulemaking, Docket No. 12-268 (Jan. 25, 2013), at 2-4.

[12] Cisco Virtual Networking Index 2011-2016, Forecast Highlights Tool, United States – Network Connections, a*vailable at* http://www.cisco.com/web/solutions/sp/vni/vni_forecast_highlights/index.html#~Country ("CVNI Forecast"). By comparison, mobile data traffic was 2 percent of all IP traffic in 2011. *Id.*

[13] Comments of Sprint Nextel Corporation, WT Docket No. 12-4, at 5 (Feb. 21, 2012). *See also* Reply Comments of Sprint Nextel Corp., WT Docket No. 12-4, at 10 (Mar. 26, 2012) ("Wi-Fi networks that are easily – even seamlessly – accessible by customers of wireless carriers can provide users with advantages of higher-speed connections without wireless data limits.").

found that mobile devices, including smartphones, are used primarily at home and work – and overwhelmingly in locations with wired networks that either do or could easily offer Wi-Fi offload. "While two-thirds of people still use their devices on the go, the world of mobile devices is changing from a 'mobile,' on-the-go world (average usage of 0.5 hours per typical day) to a 'nomadic' world dominated by the home (2.5 hours)," Cisco found.[14] Consumers reported that two-thirds of their usage is at home or work, with only 10 to 15 percent being "on the go" or outside of retail and public locations that are increasingly wired for Wi-Fi access.

## III. THE COMMISSION SHOULD MODIFY AND HARMONIZE SERVICE RULES TO FACILITATE MORE ROBUST UNLICENSED OPERATIONS ACROSS THE BAND

The Public Interest Organizations generally support the Commission's proposals to harmonize the currently divergent service rules across the band, which creates the potential for a contiguous 775 megahertz of unlicensed capacity that is all available for outdoor and indoor Wi-Fi networking, ideally at the higher power levels that apply currently to the U-NII-3 band. Contiguous unlicensed access and harmonized rules that enable access to 80 and 160 megahertz channels would greatly amplify the potential increases in capacity for Wi-Fi operations. Harmonizing the operating rules across the 200 megahertz of a combined U-3 and U-4 band is particularly important to facilitate the wide and contiguous channels needed to capitalize fully on the emerging 802.11ac Wi-Fi standard. At the same time, we believe that the benefits of harmonization around a common permissible power level and other operating parameters across sub-bands need not disrupt incumbent unlicensed operations, or limit the flexibility of WISPs or

[14] Stuart Taylor, Andy Young and Andy Noronha, *What do Consumers Want from Wi-Fi? Insights from Cisco IBSG Consumer Research* (May 2012), at 5; Stuart Taylor, *What do Mobile Business Users Want from Wi-Fi? Insights from Cisco IBSG Consumer Research* (November 2012), at 6.

other unlicensed operators, except where essential to protect federal and non-federal incumbent licensees from harmful interference.

With respect to the U-NII-4 band, we support the Commission's proposal that "U-NII devices should operate under the same framework and technical requirements specified in Section 15.407 in all three bands ranging from 5.725 – 5.925 GHz."[15] This would harmonize the unlicensed access and device rules across a contiguous block of 200 megahertz. It would encompass the U-NII-3 and the U-NII-4 bands, as well as the 25 megahertz segment at 5.825 – 5.850 that currently lies between them. Although parties differ about the extent to which the proposed U-NII-4 band (5.85 – 5.925) can be designated for unlicensed sharing – or must remain exclusively reserved for possible future Intelligent Transportation System (ITS) applications – the Public Interest Organizations support the Commission's proposal that any additional unlicensed spectrum above the current U-NII-3 band should be harmonized at the 1 Watt power levels and other rules that currently make the U-NII-3 particularly useful for outdoor and indoor Wi-Fi deployments.[16] As Time Warner Cable observed in its comments, "[b]y harmonizing the U-NII-3 and U-NII-4 rules, outdoor Wi-Fi providers will have the ideal ability to combine contiguous 80 megahertz channels to provide gigabit Wi-Fi, thereby avoiding the additional complexity and costs associated with combining non-contiguous 80 MHz channels."[17]

While we generally support harmonizing the operating parameters for unlicensed access to the U-NII-1, U-NII-3 and U-NII-4 bands – and adopting the current U-NII-3 rules that promote metropolitan Wi-Fi networking as a baseline – we question whether it is necessary to restrict the flexibility currently permitted under the Section 15.247 ISM rules that have proven so

[15] *NPRM* at ¶ 97.
[16] *See, e.g.*, NCTA Comments at 17-19; Comments of WISPA, ET Docket No. 13-49 (May 28, 2013) ("WISPA Comments") at 8 (supporting "a contiguous block of 200 megahertz of spectrum from 5725 to 5925 MHz operating under similar technical rules").
[17] Time Warner Cable Comments at 11.

useful in facilitating the use of high-gain antennas for backhaul in rural broadband deployments. On this point we agree with the Wireless Internet Service Providers Association (WISPA) that harmonized baseline rules equivalent to the current U-NII-3 service rules can provide a very robust 'worst case' for unlicensed operators, while continuing to allow for greater flexibility and more permissive spectrum sharing techniques when feasible in a particular U-NII sub-band where interference protection to band incumbents can be accomplished through stricter device certification rules.[18] Because devices in the 5725–5850 ISM band are separately certified pursuant to Section 15.247, "WISPs are able to obtain the benefits of the higher antenna gain limits to serve locations and areas that would be unreachable using any other unlicensed bands including the other 5 GHz bands."[19]

The Commission should be particularly careful not to implement harmonization in a manner that needlessly disrupts or precludes the use of 5 GHz spectrum to facilitate the provision of fixed wireless broadband service in unserved and underserved rural and remote areas where wireline backhaul is often unavailable or over-priced. The record suggests that the threat of interference to Terminal Doppler Weather Radar (TDWR) systems can be substantially mitigated by adopting rules that require enhanced security measures to prevent the illegal modification of devices to operate in non-certified bands or with non-certified technical characteristics.[20] We believe the Commission should focus interference mitigation on stricter device certification standards, including tamper-proof safeguards, rather than preclude flexibility for unlicensed operations or rely on *ex ante* enforcement. Together with enhanced waveform detection methods for co-frequency U-NII-2C operations, the Commission can ensure co-existence, without taking

[18] WISPA Comments at 6.
[19] *Id.* at 12.
[20] *See, e.g.,* NCTA Comments at 23-24; WISPA Comments at 15-17.

the more drastic step of simply eliminating use of high-gain antennas for critical long-distance links.

## IV. THE COMMISSION SHOULD REMOVE INDOOR-ONLY RESTRICTIONS ON THE U-NII-1 BAND AND HARMONIZE POWER LIMITS AND OPERATING RULES WITH U-NII-3

The Public Interest Organizations strongly support the Commission's proposal to modify the U-NII-1 rules to "eliminate the restriction on outdoor operation[s]" on the 5150-5250 MHz sub-band.[21] We urge the Commission to authorize outdoor and indoor use to the greatest possible extent across all of the current and future 5 GHz unlicensed band segments. The record demonstrates broad support and virtually no opposition to removing the restrictions on the U-NII-1 band that prohibit outdoor operations.[22] It appears that only one party, Globalstar, has asked the Commission to retain the existing restrictions, arguing that substantial numbers of outdoor devices could increase the noise level to its feeder links and earth stations.[23] However, even if testing proves that Globalstar's claims are well-founded, parties in this proceeding have proposed potential interference mitigation strategies that would still permit widespread unlicensed use of the band. For example, WISPA noted that "[b]ecause incumbent operations are identifiable and fixed, it is not necessary for the Commission to require DFS or other sharing mechanisms in this band."[24] WISPA suggested that protection zones could be designated around Globalstar's authorized earth stations, if necessary, and/or professional installation could be required in those areas. Google and Microsoft noted that a geolocation database could be used to

[21] *NPRM* at ¶ 39.
[22] *See, e.g.*, NCTA Comments at 15; Comments of the Consumer Electronics Association, ET Docket No. 13-49 (May 28, 2013) at 12; WISPA Comments at 12-16; Comments of Cablevision Systems Corporation, ET Docket No. 13-49, (May 28, 2013) ("Cablevision Comments") at 6; Comments of Comcast Corporation, ET Docket No. 13-49, (May 28, 2013) ("Comcast Comments") at 3; Google/Microsoft Comments at 5; Motorola Mobility Comments at 2.
[23] Comments of Globalstar Inc., ET Docket No. 13-49 (May 28, 2013) at 5-6.
[24] WISPA Comments at 11. *See also* Comments of Cisco Inc., ET Docket No. 13-49, (May 28, 2013) at 57 (stating that "less restrictive approaches" to protecting incumbents from higher-power, outdoor usage could be implemented).

protect fixed feeder links in the band.[25] Fastback Networks also suggested that restrictions on power at certain antenna elevation angles could protect Globalstar's feeder links.[26]

Removing the restrictions on outdoor use of the U-NII-1 band would make an additional 100 megahertz of unlicensed spectrum available at 5 MHz under rules that facilitate the deployment of high-capacity and outdoor Wi-Fi networks. WISPs and other rural broadband providers would be able to deliver more capacity at lower prices to consumers in rural and other areas with limited fixed broadband availability. For individual consumers and enterprise Wi-Fi offload networks, this additional spectrum can help overcome increasing congestion and capacity constraints in more densely populated areas as well.[27] As the Commission noted in the *NPRM*, the "wireless device market has changed dramatically" since the heavily-restricted rules for the U-NII-1 band were adopted in 1997.[28] Assumptions at that time about wireless devices operating primarily "within localized indoor settings[,] . . . may not be valid for today's market."[29] Consumers today are increasingly intensive users of broadband services on mobile devices and demand seamless and increasingly ubiquitous connectivity between indoor and outdoor locations. It is therefore increasingly important for unlicensed spectrum access to enable both use cases whenever feasible.[30]

We also agree with the broad support among commenters in favor of harmonizing the U-NII-1 rules with the increased power limits (1 Watt) that apply under the current U-NII-3 rules. As NCTA observed, "doing so will enable service providers to offer 160 megahertz 802.11ac

[25] Google/Microsoft Comments at 8-9.
[26] WISPA Comments at 11; Comments of Fastback Networks, ET Docket No. 13-49, (May 28, 2013), at 6.
[27] *See, e.g.*, Comcast Comments at 25; NCTA comments at 8-9 and Attachment A. *See also* rob Alderfer, *Wi-Fi Spectrum: Exhaust Looms*, CABLELABS at 7 (May 2013), Attachment A to NCTA's Comments. *Id.*
[28] *NPRM* at ¶ 37.
[29] *Id.*
[30] *Accord*, Time Warner Cable Comments, ET Docket No. 13-49 (May 28, 2013) at 11.

Wi-Fi channels (80+80 megahertz) through a process known as channel bonding."[31] NCTA, Comcast and other cable industry commenters note that to date, only the U-NII-3 band has proven useful for outdoor Wi-Fi deployments since it is the only sub-band at 5 GHz "not encumbered by DFS or indoor-only restrictions."[32]

Although there is disagreement in the record concerning whether the U-NII-1 rules should be harmonized with the U-NII-3 rules, or with the adjacent U-NII-2A rules, we recommend that the Commission consider adopting flexible rules that are compatible with both. For example, as WISPA proposed in its comments, the lower U-NII-2A and U-NII-2C EIRP limits could be a "baseline" minimum, while a higher EIRP could be permitted in the U-NII-1 and U-NII-3/ISM sub-bands.[33] Moreover, although spectrum sensing and Dynamic Frequency Selection (DFS) requirements are very positive tools for enabling opportunistic sharing of bands with incumbents that need that particular protection, if the Commission determines that DFS is not necessary to protect band incumbents, then permitting operations at the same power levels and other parameters that apply to the U-NII-3 band would facilitate more robust outdoor and indoor Wi-Fi deployments.

## V. THE COMMISSION SHOULD CONSIDER AUTHORIZING THE USE OF ALTERNATIVE SHARING AND INTERFERENCE-AVOIDANCE TECHNOLOGIES, PARTICULARLY GEOLOCATION DATABASE SOLUTIONS

As a final matter, the Public Interest Organizations suggests that as a geolocation database management becomes more firmly established as a secure means to govern shared access to TV band White Space and the 3550-3700 MHz band, it could be both feasible and

[31] NCTA Comments at 14.
[32] Comcast Comments at 25. *See also* NCTA Comments at 20-22; Time Warner Cable Comments at 10 ("The U-NII-3 rules, with no indoor use restrictions, higher power limits, and no DFS requirements, have proven very favorable in facilitating the deployment of fast, reliable Wi-Fi networks.").
[33] *See* WISPA Comments at Appendix A.

more efficient for certain devices and services to obtain temporary authority to transmit on 5 GHz spectrum based on frequent communication with either an established or newly-designated geolocation database manager. We agree with the proposal by Google and Microsoft that the Commission should consider authorizing this alternative approach to unlicensed operators as an alternative to DFS on an optional and voluntary basis in at least particular sub-bands where it would be equally or even more effective as a means of avoiding harmful interference to federal and non-federal incumbents.[34]

For example, as noted above, if in fact Globalstar's claims about potential harmful interference to its feeder links from outdoor and higher-power operations in the U-NII-1 band are verified, protection zones that enforce lower power limits and other restrictions to protect Globalstar's fixed sites could be automatically enforceable by employing a geolocation database solution.[35] In most situations, we anticipate that the use of a database solution would be optional and voluntary for unlicensed operators if alternative mitigation techniques, such as spectrum sensing and DFS, are sufficiently reliable under the circumstances. Nonetheless, as other shared bands governed by geolocation database mechanisms are incorporated into multi-band devices, the option to check with an authorized database to satisfy interference protection criteria is a forward-looking option that the Commission should consider at least provisionally adopting.

[34] Google/Microsoft Comments at 6-8.
[35] *Id.* at 8-9.

## VI. CONCLUSION

The undersigned Public Interest Organizations applaud the Commission for initiating this comprehensive proposal to both expand and harmonize unlicensed access across most of the 5 GHz band. Sharing rules that provide the greatest flexibility for unlicensed users to innovate and offer the most cost-effective applications and services to consumers, such as the proposals suggested above, will yield the greatest benefits for individuals and for the economy overall. We look forward to assisting the Commission in any way possible in the hope it moves quickly to adopt and implement an Order that expands and enhances unlicensed use of the 5 GHz band.

Respectfully Submitted,

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